proposed rule and on whether such failures should also be reported to the affected PSAPs in real time. In addition, we sought comments as to whether a 30-minute outage is the most appropriate time metric to measure a significant failure of call completion to a PSAP. Finally, if a commenting party were to conclude that 30 minutes is not an appropriate time metric, we requested such party to include in its comments its reasoning for that conclusion and a recommendation for a more appropriate time interval for E911 emergency calls.

60. *Comments.* The City of New York, National League of Cities and NATOA jointly endorse our proposed revisions for outage reporting related to special offices and facilities and 911 services but recommend modification of the reporting threshold to require that E911 outages lasting longer than 15 minutes be reportable.[190] Most of the objections to the proposed E911 rules center on their literal wording. For example, BellSouth states, "the Commission proposes to require the reporting of all communications outages of at least 30 minutes duration that potentially affect the ability to originate, complete, or terminate 911 calls successfully (including the delivery of all associated name, identification, and location data). BellSouth supports the Commission's desire to simplify the 911-outage reporting requirements. It states, however, that the proposed rule needs further refinement because the proposed requirement provides no measure of magnitude or impact. If the rule were to be applied literally, for example, a carrier would be required to file a report for an outage affecting only a single line."[191] As a consequence, several companies proposed the following alternative criteria:

> (1) PSAP outages affecting less than 30,000 users shall be reportable if:
>
> (a) the outage is caused by a failure in the communications provider's network;
> (b) no reroute was available; and
> (c) the outage lasts six (6) hours or more.
>
> (2) PSAP outages affecting 30,000 or more users shall be reportable if:
>
> (a) the outage is caused by a failure in the communications provider's network;
> (b) no reroute was available; and
> (c) the outage lasts for 30 minutes or more.
>
> (3) The loss of all call processing capabilities in one or more E-911 tandem(s)/selective router(s) for at least 30 minutes duration shall be reportable; and
>
> (4) The isolation of one or more end-office switches or host/remote clusters causing 30,000 or more subscribers to be isolated from 911 for at least 30 minutes duration, or the isolation of one or more end-office switches or host/remote clusters causing less than 30,000 subscribers to be isolated from 911 for at least 6 hours duration, shall be reportable.[192]

61. Qwest, USTA, Verizon, AT&T, SBC, CTIA, ATIS and BellSouth state that only a complete failure to complete a call to a PSAP should be considered to be a 911 outage. Verizon Wireless asserts that no additional information such as ANI or ALI is necessary to complete an E911 call and, therefore, the loss of such information should not be considered as triggering an E911 outage.[193] CTIA

[190] City of New York *et al.* Comments at 12-13.

[191] BellSouth Comments at 15. See also USCC Reply Comments at 6.

[192] Qwest Comments at 18; USTA Comments at 13; SBC Comments at 13; AT&T Comments at 19; ATIS Comments at 27.

[193] Verizon Wireless Reply Comments at 7.

contends that equipment has not yet been deployed for monitoring whether location determination systems are down and urges that loss of the ability to call back a caller (*e.g.*, loss of ANI) or to automatically locate users (*e.g.*, loss of ALI) should not be regarded as reportable 911-outages.[194]

62. In its reply comments, NENA[195] states, "Several industry commenters suggested that loss of automatic number identification ("ANI") and automatic location identification ("ALI") should not be reportable, and they should not be considered "serious degradations" of 9-1-1 service. We disagree. Loss of these critical and essential components of E9-1-1 should be reported to PSAPs on a timely basis, as proposed by the FCC for wireline, wireless and cable, and should be tracked in outage reporting so potential issues/problems can be identified."[196] In addition, NENA states, "We agree with the FCC 30-minute outage reporting standard, with the suggestion that it have a threshold of 100 customers."[197] NENA also rebutted the view of several commenters that "many" PSAPs do not have E911, stating that less than 10% of the counties do not have E911. BellSouth points to certain differences in its alternative 911 proposal from the alternative proposed by others. BellSouth asserts that the loss of 911 call processing capabilities in a 911 tandem defines a reportable event (and not the loss of *all* call processing capabilities in such a tandem). BellSouth also proposes a minimum reporting-threshold of 100 customers for those 911 outages that last at least six hours.[198] MCI urges the Commission not to change its reporting thresholds for 911 until after the NRIC VII completes its work.[199] Southern LINC and Southern Telecom reiterate Sprint's comment that wireless carriers do not control the end-to-end elements of a 911 call.[200] Nextel and ATIS oppose the alternative proposal of The City of New York, National League of Cities and NATOA to require 911 outages of duration 15 minutes or longer to be reported.[201]

63. Twelve commenting parties assert that the proposal to require that all outages that affect any airport be reported is overly broad.[202] They instead urge that only outages that affect small, medium or large hubs (as defined by the FAA) and that are "air traffic impacting" should be reportable. USCC states that only outages at airports of a reasonable size should be reportable.[203] Verizon states that wireless carriers should not have to report outages at airports because they do not have dedicated access lines assigned to airport towers and airport security offices.[204]

64. *Discussion.* Based on the record before us, we conclude that some revisions to our proposed 911/E911 outage-reporting criteria are justified. We adopt the following threshold criteria for reporting 911/E911 outages for wireline and non-wireline operations:

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[194] CTIA Reply Comments at 13.

[195] "NENA" is an acronym for the National Emergency Number Association. NENA Reply Comments at 1.

[196] *Id.* at 2.

[197] *Id.*.

[198] BellSouth Reply Comments at 20, 21.

[199] MCI Reply Comments at 8. See also CTIA Reply Comments at 13.

[200] Southern LINC and Southern Telecom Reply Comments at 6. *See* Sprint Comments at 26.

[201] Nextel Reply Comments at 8-9; ATIS Reply Comments at 21-22 (reiterating its alternative proposal).

[202] USTA Comments at 12; GCI Comments at 6; MCI Comments at 8-9; Verizon Comments at 15-16; BellSouth Comments at 14-15; AT&T Comments at 18; SBC Comments at 11-12; Sprint Comments at 12-13; Qwest Comments at 15-16; ATIS Comments at 25. See also MCI Reply Comments at 6; Qwest Reply Comments at 8; ATIS Reply Comments at 24; USCC Reply Comments at 7; Verizon Wireless Reply Comments at 9.

[203] USCC Reply Comments at 7.

[204] Verizon Wireless Reply Comments at 9.

(1) There is a loss of communications to PSAP(s) potentially affecting at least 900,000 user-minutes and: (a) the failure is neither at the PSAP(s) nor on the premises of the PSAP(s); (b) no reroute for all end users was available; and (c) the outage lasts 30 minutes or more; or

(2) There is a loss of 911 call processing capabilities in one or more E-911 tandems/selective routers for at least 30 minutes duration; or

(3) One or more end-office or MSC switches or host/remote clusters is isolated from 911 service for at least 30 minutes and potentially affects at least 900,000 user-minutes; or

(4) There is a loss of ANI/ALI and/or a failure of location determination equipment, including Phase II equipment, for at least 30 minutes and potentially affecting at least 900,000 user-minutes (provided that the ANI/ALI or the necessary location determination equipment was then currently deployed and in use, and the failure is neither at the PSAP(s) or on the premises of the PSAP(s)).[205]

In taking this action, we have applied the 900,000 user-minute threshold as a substitute for the 30,000 customer threshold proposed by commenting parties in order to maintain consistency with the general threshold that we have adopted. We also adopted BellSouth's suggestion to specify that it is the loss of "911 call processing capabilities" in E-911 tandem/selective routers, and not the loss "all call processing capabilities," that is the gist of this reportable event. In addition, we are persuaded by NENA's comments that ANI/ALI (callback and location identification) functionality is a fundamental part of E911 service whose loss should be considered to be a reportable event. ANI/ALI functionality or its loss can make, and has made, the difference between life and death, even in situations in which voice 911 calls were completed.[206] We understand that communications providers will not necessarily know whether the PSAP(s) receive 911/E911 communications. Therefore, the providers' responsibility is to report outages that meet the threshold criteria and that potentially affect their ability to transmit 911/E911 communications to the PSAP(s). We will not hold providers accountable for determining whether their transmissions were in fact received by the PSAP(s). For this reason, we are excluding outages caused by "failures at the PSAP(s) or on the premises of the PSAP(s)." We disagree with the contention that some of the threshold criteria should be limited to only those outages that are caused by a failure in the reporting communications provider's network. We find that it is vitally important that we be informed of all significant outages that affect PSAPs, regardless of the network(s) in which the underlying causal factors lie. This information is crucial to gleaning more quickly a fuller understanding of how outages in a network affect other networks. This is especially so where PSAPs are affected, because of their major role in protecting public safety and human lives. We also disagree with the contention that the Commission should defer addressing outage reporting requirements for E911 until the completion of NRIC VII's study of the issue, at the end of 2005.[207] We find that the public's interest in reliable and secure public safety E911 telecommunications is better served by our acting promptly.

65. We are persuaded that our original proposal to include as special facilities all airports, including those small private airports that lack modern air traffic control communications infrastructure, may be overly inclusive. Instead, we shall limit the reporting requirement to those airports that are listed

[205] We acknowledge that there are various places where these features are not yet available. Nonetheless, the general public is relying increasingly on them, and the loss of these features (where they are currently available) could be life threatening. We also are skeptical of the assertion that some communications providers are unaware of when location determination equipment is down.

[206] See, *e.g.*, http://www.nena.org/Wireless911/Tragedies.htm (visited July 21, 2004).

[207] Sprint Comments at 13; AT&T Comments at 20; ATIS Comments at 29.

as current primary (PR), commercial service (CM), and reliever (RL) airports in the FAA's National Plan of Integrated Airport Systems (NPIAS) (as issued at least one calendar year prior to the outage) for the following reasons. There are over 19,000 airports in the United States. Most of those airports are civilian landing areas that are not open to the general public. That leaves a total of 5,314 airports open to the public. Of those airports, there is a list of (currently) 3,489 airports listed in the current NPIAS plan[208] as airports that are "significant to national air transportation."[209] These airports are categorized as primary (PR), commercial (CM), reliever (RL), and general aviation (GA). There are currently 422 PR, 124 CM, 260 RL, and 2558 GA airports. Commercial airports are airports that receive scheduled passenger service and enplane at least 2,500 passengers per year. Of the primary airports, 142 are hubs.[210] A hub is a commercial airport that individually enplanes at least .05% of the total U.S. customer volume per year. All hub airports will be covered by our outage reporting requirements. We also find that the primary non-hub airports, which are commercial airports that enplane over 10,000 passengers per year, should be covered by these requirements. Similarly, we are including reliever airports, which are airports that are used as alternatives for congested hubs, as well as providing general aviation service to the surrounding area. In contrast we will exclude at this point general aviation airports, which are the airports that do not receive scheduled commercial service. In sum, 806 airports – the 422 primary airports including all hubs, the 124 commercial service airports, and the 260 reliever airports that are used as alternative airports for congested hubs – will now be covered by the revised outage-reporting requirements for special facilities that we are adopting herein.[211]

66. As commenting parties have pointed out, the critical communications infrastructure serving airports is landline based. Therefore, the outage-reporting requirements for special offices and facilities, insofar as they cover communications to airports, will not be applied to satellite and terrestrial wireless communications providers at this time.

C. *Further Notice of Proposed Rule Making (Airports)*

67. Potentially, all of the airports in the United States may need to be used by aircraft for emergency landings. The potential loss life or property through commercial aircraft crashes can be catastrophic. The need for communications among non-commercial (as well as commercial) airports and the rest of the United States becomes more apparent in the contexts of general aviation and government aviation in which many non-commercial planes carry, for example, personnel who are essential to national defense and homeland security, as well as government officials from Federal, state, local, and foreign governments. Moreover, all of the airports in the United States are potential launching pads for terrorist activities. As a consequence, it is essential that all personnel at airports throughout the United States be able to access appropriate government and civilian personnel to avert acts of terrorism. Finally, commercial communications links are used by airports to support navigation, traffic control, maintenance,

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[208] NPIAS compiles a list of airports it feels should be eligible for Airport Improvement Program (AIP) grants. It does a study every five years and puts together a five-year plan for those airports. The current plan covers the years 2001-2005. See http://www.faa.gov/arp/planning/npias/npias2001/appenda/NPIAS01A.pdf for the list of airports.

[209] http://www.faa.gov/arp/planning/npias/index.cfm?ARPnav=npias.

[210] These are divided into 31 large, 37 medium, and 74 small hubs. A medium hub enplanes .25% to 1% and a large hub enplanes at least 1%. The FAA provides public access to descriptions of these airports in its website, which may be accessed at http://www.faa.gov/arp/planning/npias/npias2001/npias[illegible]df at 5.

[211] Although we believe that all communications providers will be able to adapt fairly easily to the inclusion of these airports within the outage-reporting requirements for special offices and facilities, we recognize that in some cases small rural communications providers might not be able to comply with the revised rule. In such cases, we anticipate granting appropriate waivers of this rule to providers that file a written request for waiver of the rule that is supported with clear and convincing evidence of the need for such a waiver.

and restoration. Those commercial communications links need to be functioning continuously. We find, however, that the record in this proceeding does not support further extending outage reporting requirements in this area. As a consequence, we are initiating this *Further Notice of Proposed Rule Making* to expand the record in this proceeding to focus specifically on the unique communications needs of airports. In this regard, we request comment on the additional types of airport communications (*e.g.*, wireless, satellite) that should be subject to service disruption reports. This may include, for example, communications that are provided by ARINC as well as commercial communications (*e.g.*, air-to-ground and ground-to-air telephone communications) as well as intra-airline commercial links. We also seek comment on whether the outage-reporting requirements for special facilities should be extended to cover general aviation airports and, if so, what the applicable threshold criteria should be.

D. Elimination of Separate Reporting Requirement for Fires

68. A separate reporting requirement, set forth in Section 63.100(d), pertains to the reporting of outages caused by fires. Carriers are required to report fire-related incidents that affect 1,000 or more service lines for a period of 30 minutes or more.[212] Only a few outages have been reported pursuant to this subsection and these have tended to be very minor outages. In general, major fire outages have met the more general reporting criteria because they exceed the current 30-minute, 30,000-customer threshold criteria. Such outages would also exceed the proposed 900,000 user-minute threshold criterion. Thus, we tentatively concluded that retention of separate outage reporting criteria for fire-related incidents was an unnecessary complication for reporting carriers that does not provide any significant benefit to the Commission or to the public. We therefore proposed to eliminate this requirement. We sought comment on this conclusion and our proposed elimination of this rule. Commenting parties unanimously support elimination of this rule for the reasons that we advanced in the *Notice*. We therefore conclude that the separate reporting requirement for outages caused by fires no longer serves the public interest and rescind that requirement.

E. Simplified Time Calculation for Filing Initial Report

69. *Proposal.* An initial outage report is required to contain contact information so that additional information can be obtained if necessary. Initial reports are helpful in determining whether an immediate response is required (*e.g.*, terrorist attacks or systemic failures) and whether patterns of outages are emerging (*e.g.*, phased terrorist attacks) that warrant further coordination or other action.[213]

70. Section 63.100 of our rules currently distinguishes between how quickly outages, of at least 30 minutes duration, are required to be reported, based on whether the number of customers potentially affected meets or exceeds a threshold criterion of 50,000. If this secondary threshold is exceeded, the carrier's initial report must be made "by facsimile or other record means delivered within 120 minutes of the carrier's first knowledge. . . ."[214] Otherwise, when such outages potentially affect less

[212] Section 63.100(d) of the Commission's Rules, 47 C.F.R. § 63.100(d).

[213] The initial service disruption report "shall identify a contact person who can provide further information, the telephone number at which the contact person can be reached, and what information is known at the time about the service outage.... [l]ack of any of the above information shall not delay the filing of this report." Section 63.100(b) of the Commission's Rules, 47 C.F.R. § 63.100 (b). Final service disruption reports, which are due not later than thirty days from the date of the outage, shall provide "all available information on the service outage, including any information not contained in [the] Initial Service Disruption Report and detailing specifically the root cause of the outage and listing and evaluating the effectiveness and application in the immediate case of any best practices or industry standards identified by the Network Reliability Council to eliminate or ameliorate outages of the reported type." *Id.*

[214] Section 63.100(b) of the Commission's Rules, 47 C.F.R. § 63.100(b).

than 50,000 customers (but satisfy the primary threshold criterion of 30,000 customers), the initial notification must be delivered within "3 days of the carrier's first knowledge."[215] We tentatively found that this distinction complicates the outage reporting requirements without any off-setting benefit and, therefore, proposed to eliminate it.

71. The current rule requires that the filing be made "by facsimile or other record means."[216] In the future, the ability to file initial reports electronically (*e.g.*, over the Internet), coupled with the "fill in the blank" template[217] that we proposed in the *Notice*, we tentatively concluded, should make it possible for communications providers to notify us more promptly, and more easily, when communications disruptions arise. We tentatively concluded that the improvements in filing requirements, as well as the electronic filing process that we proposed, should make it easy for communications providers to file initial disruption reports within 120 minutes of discovering a reportable outage. This, in turn, would facilitate more rapid action in the event of a serious crisis, and would also facilitate more rapid, more coherent, and more accurate responses whenever multiple outages were top occur during simultaneous (or virtually coincident) crises. We therefore proposed to require all initial outage reports to be filed electronically within 120 minutes of becoming reportable and all final outage reports to be filed within 30 days of the initial report. We sought comment on these conclusions and proposed requirements. We also sought comment as to whether, given the rapid response time that the Internet and circuit-switched telephony (*e.g.*, dial-up modems) enable, we should require the filing of initial outage reports over the Internet within a shorter period of time than the 120-minute period discussed above.

72. *Comments.* Many commenting parties object to the proposed 120 minute window for providing an initial report.[218] For example, Verizon states:

> [i]ronically, the Commission's proposal to require a detailed initial report in 120 minutes would have the perverse effect of delaying future restoration efforts, because it would require telecommunications companies to divert resources to immediate reporting of outages rather than restoring service to their customers.[219]

Currently, initial reports for outages potentially affecting at least 50,000 customers for at least 30 minutes must be submitted within 120 minutes – hence, the 120-minute time frame for initial reports has been used, successfully, for more than 10 years and cannot now be regarded as unrealistic. Instead, the underlying argument appears to be that our proposed report template would divert resources by requiring initial reports to contain "detailed" information, with all data fields completed. For example, the Rural ILECs state that the 120-minute threshold would be unrealistic because it would take 5 hours to complete the initial outage report.[220] PanAmSat and SES Americom recommend that we clarify that the data for

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[215] Section 63.100(c) of the Commission's Rules, 47 C.F.R. § 63.100(c). This distinction between how quickly outages must be reported is a historical vestige of how the original reporting criteria were developed. See Network Reliability: A Report to the Nation – Compendium of Presentations, Section I (NRC, June 1993) at 3.

[216] Section 63.100(b) of the Commission's Rules, 47 C.F.R. § 63.100(b).

[217] *See Notice, supra*, note 1, Appendix C for the template that we proposed for Internet reporting of outages by communications providers.

[218] BloostanLaw Rural Carriers Comments at 2; Sprint Comments at 18; Qwest Comments at 9; BloostonLaw Paging Group Comments at 7; Rural ILECs Comments at 3; Verizon Comments at 6; ITTA Comments at 3; T-Mobile Comments at 19; CTIA Comments at 15; GCI Comments at 5; Cingular Comments at 17.

[219] Verizon Comments at 6.

[220] Rural ILECs Comments at 6.

many fields would be unknown and therefore the corresponding field can be left blank on initial reports that are submitted 120 minutes after an outage becomes reportable.[221] There are several alternative suggestions for the timing of initial reports: Rural ILECs suggest that outages be reported orally within 24 hours;[222] GCI suggests that initial reports be submitted within 24 hours;[223] BloostonLaw Rural Carriers suggest within 2 days;[224] Blooston Law Paging Group suggests semiannually or annually;[225] T-Mobile, Cingular and CTIA suggest 72 hours (unless the template were simplified).[226] T-Mobile suggests that the template for the initial report be simpler than the template for the final report.[227] In addition, BloostonLaw Rural Carriers suggest that final reports be due in 60 days (as opposed to the currently required 30 days).[228]

73. Many commenting parties[229] suggest, instead of the existing two-step process of filing initial and final reports, that we adopt variations of the following 3-step process:

> 1. *Notification.* The first step - notification - would be required on all outages believed to be reportable in accordance with the Commission's rules. Notification would have to occur within two hours of carrier knowledge and could be made through electronic filing, telephone or facsimile, with electronic filing being the preferred method. The notification should require minimal information (*i.e.*, Reporting Entity, Date, Time, Brief Description of Problem, Services Affected, Geographic Area, Contact Name, and Contact Number).
>
> This notification step will serve to notify the Commission that a major event has occurred and would assist in determining whether an immediate response is required and whether patterns of outages are emerging that might warrant further coordination or other action. The addition of this step also would allow the Commission to be informed without interfering with the restoration process. In addition, by providing contact information as part of the initial notification, the Commission would be able to contact the carrier for additional information, if necessary. Thus, notification as described above, would serve the Commission's essential national security needs without unduly burdening providers.
>
> 2. *Initial Report.* The second step, after notification, would be the submission of the initial report within 72 hours of the notification. Setting the filing deadline for the initial report at 72 hours is reasonable given that it allows the provider the time necessary to gather more complete information. The initial outage report would be mandatory and would include information more detailed than contained in the notification (*e.g.*, the extent of the incident, causes if known)...A provider would be required to follow up each

[221] PanAmSat and SES Americom Joint Comments at 7.

[222] Rural ILECs Comments at 3.

[223] GCI Comments at 5.

[224] BloostonLaw Rural Carriers Comments at 5.

[225] BloostonLaw Paging Group Comments at 8.

[226] T-Mobile Comments at 20; CTIA Comments at 15; Cingular Comments at 17.

[227] T-Mobile Comments at 20.

[228] BloostonLaw Rural Carriers Comments at 2.

[229] Qwest Comments at 21; USTA Comments at 14; Verizon Comments at 8; SBC Comments at 17; AT&T Comments at 24; ATIS Comments at 30.

notification with either an initial outage report or retraction of a notification. This option would allow a provider to retract any inaccurate notification without having to submit a formal retraction letter.

3. *Final Outage Report.* The final outage report would be due within 30 days of the event and would provide all information about the event, its causes, and resolution, as required in the proposed reporting template. Similar to the current outage reporting process, the final report would include an attestation.[230]

74. In their reply comments, Qwest, MCI and ATIS support the three-step reporting proposal outlined above.[231] In addition, Qwest supports BellSouth's recommendation that the notification provide the following limited amount of information: "Reporting Entity, Date, Time, Brief Description of Problem, Services Affected, Geographic Area, Contact Name and Contact Number."[232] Verizon and USCC support the alternatively proposed 72-hour time frame for filing the initial report.[233] Southern LINC and Southern Telecom state that our proposed 120-minute time frame is not enough time to file an initial outage report.[234]

75. *Discussion.* We are persuaded that the three-step approach suggested by various commenting parties would best provide the information that we need in an efficient and timely manner. Notification within two hours of the provider's first knowledge of the outage will alert the Commission and DHS that a significant outage might be underway and will also provide some essential initial information (*e.g.*, who to contact if more information were required in order to proceed further) if it is necessary to proceed further. This will also not impose any significant burden on the provider's restorative efforts. Efficient, electronic, Web-based filing, using a "fill-in-the-blank" template will be the preferred method of notification, but since there cannot be a guarantee that any particular method of communications would be operating normally, other written alternatives (*e.g.*, FAX, courier) would be equally acceptable. We adopt the BellSouth/Qwest proposal that the following items – Reporting Entity, Date, Time, Brief Description of Problem, Services Affected, Geographic Area, Contact Name and Contact Telephone Number be included in the notification. At the three-day (72-hour) mark, the initial report would be due. The data contained in the initial report would tend to be more complete and accurate than those that are filed at the two-hour mark under our current reporting rule. It may be the case, as PanAmSat and SES Americom suggest, that varying amounts of information will be available at the three-day mark from one outage to another and, thus, that not all data fields in every initial outage report will be able to be completed on time. We understand this but expect that reporting providers will exercise good faith in filling out the initial report as completely as possible. As a result, use of the same template for initial and final reports will enable reporting entities to submit all available information in the initial report and re-use that information in the final report to the extent that it is still accurate. Attestation will be required for the final report only.[235]

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[230] BellSouth Comments at 19.

[231] Qwest Reply Comments at 9; MCI Reply Comments at 8; ATIS Reply Comments at 23.

[232] Qwest Reply Comments at 10.

[233] Verizon Wireless Reply Comments at 8; USCC Reply Comments at 7.

[234] Southern LINC and Southern Telecom Reply Comments at 7.

[235] The attestation requirement is contained in Section 4.11 of our rules. *See* Appendix B, Section 4.11, *infra*. For a thorough discussion regarding the burden placed on communications providers by the revised rule, see our PRA analysis, *infra* ¶¶ 162-171, and our FRFA analysis, *infra* Appendix D.

F. Other

76. Our experience in administering Section 63.100 has enabled us to understand more completely other aspects of the existing reporting requirements that should be revised. As a consequence, we tentatively found that existing requirements for final disruption reports should be modified to include the following information:

- A statement as to whether the reported outage was at least partially caused because the network did not follow engineering standards for full diversity (redundancy);[236] and

- A statement of all of the causes of the outage. Outages may result from the occurrence of several events. The current rule requires that the final report identify the root cause.[237] Experience in administering this part of our rules has convinced us that there may be more than one root cause and that, to facilitate analysis, all causes of each outage should be reported.

In addition, as the communications market evolves, we anticipated that communications may increasingly be offered through complex arrangements among communications providers and other entities (which may or may not be affiliated with the provider) that maintain or provide communications networks or services for them. For example, local exchange carriers have long provided Signaling System 7 ("SS7") communications for their own use as well as for their customers, but some entities have more recently emerged to provide SS7 for such carriers. We proposed to require these entities to comply with any disruption reporting requirements that we may adopt to the same extent as would be required of the communications provider if it were directly providing the voice or data communications or maintaining the system. We sought comment on these proposals.

77. *Comments.* Several commenting parties object to inclusion of a statement (checkbox) in every outage report as to whether absence of diversity was the cause or a partial cause of the outage.[238] For example, Qwest states:

> It would require an additional statement regarding whether the outage was at least partially caused because the network did not follow engineering standards for full diversity (redundancy), as well as a statement of all the causes of the outage, instead of just a root cause, as currently required. These proposed new requirements are also unnecessary. The Commission's current rules require that Final Reports contain a statement regarding whether or not best practices could have avoided an outage,

[236] Diversity refers to the deployment and operation of redundant assets (*e.g.*, transmission facilities, network equipment, or logical paths) to achieve survivable communications in the event of a failure. Diversity requirements are specified in applicable industry standards and best practices, *see, e.g.*, the following requirements for Signaling System 7 networks: ANSI T1.111-2001 Signaling System No. 7, Message Transfer Part; ATIS/NIIF-5001 Network Interconnection Interoperability Forum Reference Document – March 2004 – Issue 6.1; GR-246-CORE, Telcordia Technologies Specification of Signaling System Number 7 (SS7); and GR-905-CORE, Common Channel Signaling Network Interface Specification (CCSNIS) Supporting Network Interconnection, Message Transfer Part (MTP) and Integrated Services Digital Network User Part (ISUP). Full diversity encompasses electronic, logical, optical, and physical diversity.

[237] 47 C.F.R. § 63.100(h) (1).

[238] Sprint Comments at 19; Qwest Comments at 26; Syniverse Comments at 5; USTA Comments at 16; SBC Comments at 18; AT&T Comments at 26; Iridium Comments at 7; ATIS Comments at 36.

> including best practices for diversity/redundancy capabilities. Thus, the current rule already adequately encompasses diversity/redundancy. This is all the more true since a change from reporting based on best practices to one based on engineering standards is impossible to implement. There currently are no engineering standards in the industry regarding diversity/redundancy. Accordingly, the proposed new rule would be impossible to comply with.[239]

Several commenting parties urge that there can be only one root cause for any outage and that, therefore, the final report should require the listing of only one root cause, although there can be many other contributing factors.[240]

78. Regarding our proposal to extend outage reporting requirements to third party entities that maintain or provide communications networks or services for covered communications providers, Ericsson states that, in the case of terrestrial wireless communications, only wireless service licensees should be required to report outages.[241] Ericsson recognizes that any licensee may contract with an unrelated third party to perform services for the licensee, but it observes that licensees have always borne ultimate responsibility to the Commission for controlling the operation of their networks. It notes that if the unrelated third party fails to provide the necessary outage information to the licensee, the licensee may seek its recourse under its service agreement with the third party.[242] Finally, Ericsson suggests that by extending the outage-reporting requirement to non-licensees, the quality of outage information that the Commission will receive could be lessened, because the Commission will lose the opportunity to rely on the licensee's special duty to be honest with the Commission.[243] Syniverse suggests that third-party providers of signaling be afforded reporting requirements that better reflect how SS7 signaling services are provisioned.[244] It suggests that service level agreements negotiated between third-party SS7 signaling providers and carriers would contain provisions outlining the respective outage reporting obligations and service resolution obligations of the SS7 signaling provider and the carrier. Syniverse asserts that the Commission should rely on the parties' performance pursuant to the service level agreement in order to be assured of more accurate reporting and quicker service resolution. KCC appears to support Syniverse's alternative proposal.[245] KCC recognizes that SS7 providers "may have first hand knowledge of service-affecting disruptions and may be able to provide more detail as to cause and circumstances leading up to an interruption. However, jurisdictional issues may complicate the [Commission's] and/or various state commissions' authority in this area."[246] KCC therefore suggests that the outage reporting requirements remain with the certificated service provider.[247] Although a service provider may by contract outsource certain services, KCC asserts that the certificated service provider always remains ultimately responsible for providing the service and is held accountable to its end users.

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[239] Qwest Comments at 26. *But see supra* note 236.

[240] Sprint Comments at 20; Qwest Comments at 27; SBC Comments at 18; AT&T Comments at 26; Iridium Comments at 7; ATIS Comments at 36.

[241] Ericsson Comments at 3-5.

[242] *Id.* at 3 n.5.

[243] *Id.* at 5.

[244] Syniverse Comments at 2-5.

[245] KCC Comments at 4.

[246] *Id.*

[247] *Id.*

79. BellSouth, on the other hand, supports the Commission's proposed extension of outage-reporting requirements to all providers of SS7 service.[248] It states that "[b]ecause SS7 outages have the potential to affect large numbers of end users and can have a large impact on the reliability and availability of the public switched telephone network, it is reasonable to require disruption reporting for SS7 service from all SS7 providers."[249] AT&T states that third party entities providing SS7 service should be subject to the same final reporting guidelines as carriers.[250] In its reply comments, Verisign asserts that third party SS7 providers should not have to report because they do not know the impact of the outages.[251]

80. *Discussion.* We find that the public interest will be best served by requiring that final outage reports identify whether the outage was at least partially caused because the network did not follow engineering standards for full diversity (redundancy).[252] In an era in which networks are increasingly interconnected and in which there is heightened concerns that a failure of one network could conceivably cause the failure of other, interconnected networks, we find it important to facilitate analysis of the extent to which lack of diversity causes significant network outages. To analyze the text fields of existing outage reports manually for variations from best practices and for lack of diversity would be a very time consuming task. If past outage reports had contained a checkbox for identifying a lack of diversity, those analyses could have been readily done. In any event, we deem it important to discover if increased diversity would appreciably prevent the occurrences of outages. Therefore, we conclude that the outage template should, as proposed, include a checkbox for diversity. In general, if Best Practices related to diversity are discussed in any of the Best Practice fields or if lack of diversity is listed as a root cause or contributing factor to the outage, then the diversity checkbox must also be checked. In addition, we have been persuaded by those comments[253] that assert that each outage has only a single root cause but may have many contributing factors. Accordingly, reporting entities will be required to reveal in the final outage report the root cause of the outage and several contributing factors (if any) to the outage.

81. Regarding outage reporting by third party entities that maintain or provide communications networks or services for covered communications providers, we adopt our proposal. We point out that equipment manufacturers or vendors that do not maintain or provide such networks or services will not be subject to outage-reporting requirements. As BellSouth cogently observes: "SS7 outages have the potential to affect large numbers of end users and can have a large impact on the reliability and availability of the public switched telephone network" and therefore "it is reasonable to require disruption reporting for SS7 service from all SS7 providers."[254] Although, as Syniverse, KCC, and Ericsson observe, third party entities and communications providers should fully cooperate in assembling outage report data and in restoration efforts, we do not deem it advisable to countenance any delay that could result from these coordination efforts or from any emerging contractual disputes among the parties with respect to their service agreements. The outage reporting requirements we are adopting

[248] BellSouth Comments at 25-26.

[249] BellSouth Comments at 25. BellSouth also proposes alternative threshold criteria for SS7 outage reporting. *Id.* at 26. This proposal will be addressed below in the section where we discuss our proposal for SS7 reporting.

[250] AT&T Comments at 23-24.

[251] Verisign Reply Comments at 1.

[252] We find Qwest's assertion (Comments at 26) that there "currently are no engineering standards in the industry regarding diversity/redundancy" to be inconsistent with existing standards in the telecommunications industry. *See, e.g., supra* note 237 (list of several applicable standards).

[253] ATIS Comments at 36, SBC Comments at 18, AT&T Comments at 26.

[254] BellSouth Comments at 25.

serve not only the general, long-term interests of network reliability and security, and potential resultant improvements in customer service, but also the overarching need to obtain rapidly and accurately outage data that could serve the vital interests of homeland security. Our proposal better serves those vital interests and we therefore adopt it.

IV. Outage Reporting Requirements for Wireline Communications

A. Voice Telephony

82. In the *Notice*, we used the term "wireline provider" to refer to an entity that provides terrestrial communications through direct connectivity, predominantly by wire, coaxial cable, or optical fiber, between the serving central office (as defined in the glossary to Part 36 of the Commission's Rules)[255] and end user location(s).[256] We proposed to require wireline providers to report outages that meet the following criteria:

- The outage duration must be at least 30 minutes; *and*
- The number of "user-minutes" potentially affected must equal or exceed 900,000.

83. For telephony, we proposed to define the number of end users as the number of "assigned telephone numbers," by which we mean the sum of "assigned numbers" and "administrative numbers" as defined in Section 52.15(f)(i) and (iii) of the Commission's Rules.[257] Assigned numbers are defined as "numbers working in the Public Switched Telephone Network ("PSTN") under an agreement such as a contract or tariff at the request of specific end users or customers for their use, or numbers not yet working but having a customer service order pending."[258] Administrative numbers are "numbers used by telecommunications carriers to perform internal administrative or operational functions necessary to maintain reasonable quality of service standards."[259] We tentatively concluded that the combination of these two measurements would provide a better assessment of the number of users that are potentially affected by the communications disruption, as distinguished from the number of "customers" that may be potentially affected.[260]

84. *Comments.* The City of New York, the National League of Cities, and the National Association of Telecommunications Advisors, the Connecticut Department of Public Utility Control, and the eCommerce and Telecommunications Users Group support our proposal to use a common metric.[261] ATIS and several other commenting parties argue that the use of blocked calls, or access lines, are much better indicators of the impact of an outage than the number of assigned telephone numbers potentially

[255] 47 C.F.R. Part 36, Appendix-Glossary.

[256] Wireline communications may also be augmented through the use of micro-wave links and other links that use other radio frequencies. It is our intention to include these fixed service technologies with the other wireline technologies described above.

[257] 47 C.F.R. § 52.15(f) (i), (iii).

[258] 47 C.F.R. § 52.15(f) (iii). That subsection also states "[n]umbers that are not yet working and have a service order pending for more than five days shall not be classified as assigned numbers."

[259] 47 C.F.R. § 52.15(f) (i).

[260] See *supra* ¶¶ 20-23.

[261] City of New York *et al.* Joint Comments at 2; CDPUC Comments at 3; eTUG Reply Comments at 1, 5.

affected.[262] In cases where the number of blocked calls is unavailable, they suggest that the outage-reporting threshold criteria should be based on the number of "lines in service" potentially affected:

> For those communications providers that have the ability to use blocked call counts, ATIS proposes an outage be reported if it: (1) lasts for thirty (30) or more minutes; (2) generates 90,000 blocked calls based on real-time traffic data; and (3) involves a survivable element. If real-time traffic data is unavailable, then a communications provider would report an outage if it: (1) lasts for thirty (30) or more minutes; (2) affects 30,000 calls based on historic traffic data; and (3) involves a survivable element. Finally, for those communications providers that do not have the ability to identify blocked call data, a different threshold would be used. For these providers, an outage would be reportable if it: (1) lasts for thirty (30) or more minutes and affects 30,000 or more "lines in service," or lasts for at least six hours and affects 30,000 or fewer "lines in service"; and (2) involves a survivable element.[263]

85. Commenting parties have come up with a number of different names for the connection between the serving central office and end user locations, such as access lines,[264] lines in service,[265] customer lines,[266] and affected lines.[267] They assert that the use of assigned telephone numbers would result in an over counting of the number of end users affected by outages.[268] ATIS also claims that the NRUF[269] reports "do not reflect working telephone lines" while other commenting parties claim various problems with the NRUF reports.[270] In addition, ATIS points out that the proposed reporting scheme may generate more outage reports. Also, ATIS asserts that, for an outage to be reportable, it must involve the failure of a "survivable element," which it defines as "switching or transmission equipment that has active redundant capability." ATIS[271] and others commenting parties also define "survivable element" as a host or remote switch. USTA[272] takes this one step further and states that "in order to qualify as an outage, the failure must be associated with the failure of a network element (i.e. switch, transport, power) and that feeder cables or non-intelligent elements be exempt.". Finally, ATIS[273] and others assert that the NRUF

[262] *See, e.g.,* ATIS Comments at 16; Bell South Comments at 6.

[263] ATIS Comments at 16; SBC Comments at 6-7; BellSouth Comments at 11; USTA Comments at 10.

[264] ATIS Comments at 17; BellSouth Comments at 6; ITTA Comments at 5; Qwest Comments at 6; SBC Comments at 5; and USTA Comments at 6, 7, 9, and 17.

[265] ATIS Comments at 16; Qwest Comments at 6; SBC Comments at 6; and Verizon Comments at 3 and 9.

[266] ATIS Comments at 17.

[267] Verizon Comments at 11.

[268] ATIS Comments at 13, 17, and 18; BellSouth Comments at 7; MCI Comments at 2; Qwest Comments at 7; SBC Comments at 4 and 5; USTA Comments at 8; Verizon Comments at 9.

[269] NRUF is a contracted acronym that the telecommunications industry has developed under the Industry Numbering Committee (INC) to assist carriers in implementing Section 52.15 (47 C.F.R. § 52.15) of the Commission's telephone numbering rules. Its full title is "North American Numbering Plan Numbering Resource Utilization/Forecast Reporting (NRUF) Guidelines." The latest edition of these guidelines was issued by ATIS on March 23, 2004, and is identified as INC 00-0619-0.

[270] AT&T Comments at 12; ATIS Comments at 13; AT&T Comments at 12; BellSouth Comments at 7-10; Verizon Comments at 10.

[271] ATIS Comments at 18.

[272] USTA Comments at 10.

[273] ATIS Comments at 13.

data that would be needed to determine the number of assigned telephone numbers potentially affected by outages can be outdated by six months and is cumbersome and time-consuming to use.

86. *Discussion.* We agree with a number of commenting parties that our proposed use of assigned telephone numbers as a count of *potentially* affected wireline end users could result in a small over counting, which might unnecessarily increase the number of reports. Hence we will revise our requirement to include assigned telephone number *or* working telephone numbers, where working telephone numbers refer to telephone numbers that have been assigned and provisioned for service.[274] Working telephone numbers include direct inward dialing ("DID") telephone numbers assigned to PBX and Centrex customers. Service providers may be aware of working telephone numbers to support their billing and operations processes and, if so, may use working telephone numbers in place of assigned telephone numbers. If the working telephone numbers are unknown for any reason, assigned telephone numbers must be used.

87. Blocked calls, which were proposed as an alternative by a number of commenting parties, measure the actual impact, not the potential impact, of an outage. Our concern is to identify problem areas in the network by receiving reports on events that, if they had occurred at a different time or on a different day of the week, could have affected many users. We are not interested primarily in a tally of the exact number of users that were affected because we have not, and do not currently intend to rank or rate outage reports based on their actual impact on end users.

88. Furthermore, as discussed more fully above,[275] the use of blocked calls as a reporting criterion would result in a significant undercounting of the number of end users *potentially* affected by outages.[276] We find that the use of "access lines in service" or any of the other types of lines mentioned in the comments would suffer from the same flaw primarily because there are no useful definitions on the record for any of those terms. A Verizon e-mail, dated June 11, 2004,[277] clearly illustrates problems in the use of "access lines" in that many connections among end users and their serving central office are not being counted. The Verizon e-mail explained that an outage of a switch, which serves approximately 190,000 working telephone numbers, was not reported because Verizon had determined that less than 28,000 "access lines" were potentially affected. Verizon also explained that its definition of "access line" includes switch line-side connections only, and excludes all of the trunk-side connections that serve its multi-line business and PBX customers. By contrast, if Verizon had counted the end users in the manner that we are requiring, it should have been clear that the outage caused by the switch failure would have had to be reported.[278]

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[274] To be more specific, "working telephone numbers" are defined to be the sum of all telephone numbers that can originate, or terminate telecommunications. As a consequence, this would include, for example, all working telephone numbers on the customer's side of a PBX or Centrex.

[275] See *supra* ¶ 55.

[276] We note that the number of blocked calls, which reflects the actual immediate impact of the outage, would continue to be included in the outage report. But it is the *potential* impact of an outage that is far more significant in triggering an outage report that can be used for identifying network problem areas that need to be addressed to prevent future outages. For this reason, measuring the potential impact of outages is simply the first step in helping us to determine if adequate facilities are being provided to serve communications for all of the people of the United States.

[277] E-mail from Ann D. Berkowitz, Associate Director, Federal Regulatory Advocacy, Verizon to Whitey Thayer, Senior Engineer, F.C.C., Office of Engineering and Technology , June 11, 2004, 5:16 p.m.

[278] As a more generalized example, a large PBX or Centrex with many users, working stations, and telephone numbers can be connected to a switch by a relatively small number of lines or trunks. Simply counting these lines or trunks would underestimate the number of potentially-affected end users. In fact, even counting telephone (continued....)

89. We disagree with ATIS's assertions about inaccuracies and "out-datedness" of, and difficulties in using, NRUF data. ATIS's claim that the NRUF reports "do not reflect *working telephone lines*" is not apposite because the Commission's rules, which are also clearly set forth in the NRUF instructions, state that "assigned numbers are *numbers working* in the Public Switched Telephone Network."[279] In addition, it is not clear what definition of "working" ATIS is using in reference to access lines. We emphasize that telephone switches are not designed to enable every telephone number that can be served by a switch to be actually served simultaneously, but every such number is *potentially affected* if the switch fails. Our rules and the NRUF guidelines clearly spell out the five mutually exclusive utilization categories in which telephone numbers are to be counted. These categories cover all of the various problem areas mentioned in the comments.

90. Similarly, ATIS and other's proposed requirement -- that a "survivable element" must fail in order for an outage to be reportable[280] -- fails to account for the fact that end users are potentially affected by outages regardless of whether "survivable elements" fail. We take particular exception to the USTA comment[281] that outages should not be required to be reported if "non-intelligent elements" are involved regardless of the number of users affected. We stress that our concern is with the communications users, not with the intelligence or lack thereof in various network elements. As ATIS and others state, the adoption of our proposal could result in the filing of more outage reports than have been filed under the existing reporting threshold criteria. We do not believe that the number of such reports will dramatically increase, but the additional data will better enable the Commission to meet its responsibilities to facilitate increased reliability and security of our nation's telecommunications infrastructure.

91. Finally, we reject the assertions that it is difficult and cumbersome for wireline providers to use NRUF data to determine the number of assigned telephone numbers potentially affected by outages. The NRUF data is reported by rate center, and the individual utilization records in each rate center are reported by NPA, NXX, and the thousands digit of the telephone numbers. It is a simple, straight forward process for wireline providers to use the LERG[282] to sum up the utilization of all the numbers served by each switch to determine the total assigned numbers and administrative numbers. We note that none of the smaller carriers or their industry associations that submitted comments in this proceeding has raised any concern regarding their ability to track assigned and administrative numbers for each switch. All wireline carriers continuously keep track of assigned and administrative numbers so that an incoming call to any of those numbers can be switched to the correct line and trunk, so that they can respond to requests for new service or for specific vanity telephone numbers. As a consequence, we find that our proposal will best serve the public interest and, therefore, we adopt it.

B. IXC and LEC Tandem Outages

92. Section 63.100(g) states that, for the tandem facilities of interexchange or local exchange carriers, "carriers must, if technically possible, use real-time *blocked calls* to determine whether criteria

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(...continued from previous page)
numbers may underestimate the impact, particularly in the case of PBXs for which unique telephone numbers are not assigned to each end user.

[279] 47 C.F.R. § 52.15 (f)(1)(iii) makes no reference to the number of "lines."

[280] ATIS Comments at 16, SBC Comments at 6-7, BellSouth Comments at 11, USTA Comments at 10.

[281] USTA Comment at 10.

[282] LERG is an acronym for the Local Exchange Routing Guide, which is published by Telcordia and updated monthly.

for reporting an outage have been reached. Carriers must report IXC and LEC tandem outages . . . where more than 90,000 calls are blocked during a period of 30 or more minutes for purposes of complying with the 30,000 potentially affected customers threshold."[283] We proposed to modify this rule to replace the "customer" metric with the "assigned telephone number-minute" metric, in order to be consistent with the other modifications that we proposed. We also noted that the term "blocked calls" is not clearly defined in Section 63.100 and that some companies have counted only originating calls that are blocked, while other companies count both originating and terminating blocked calls. To eliminate this ambiguity and permit the Commission to gain an understanding of the full impact of each outage, as well as to promote consistent reporting by all carriers, we proposed to require that all blocked calls, regardless of whether they are in the originating or terminating direction, be counted in determining compliance with the outage reporting threshold criteria.

93. For those outages where the failure prevents the counting of blocked calls in either the originating or terminating direction, or in both directions, historical data may be used.[284] We tentatively concluded that three times the actual number of carried calls for the same day of the week and the same time of day should be used as a surrogate for the number of blocked calls that could not be measured directly.[285] We also clarified that "blocked calls" are a "running measurement" made for the total duration of the outage. That is, an outage that blocks only 50,000 calls in the first 30 minutes may nevertheless reach the 90,000 blocked-call threshold criterion if the outage lasts, for example, for one hour. In relatively rare cases, it may be possible to obtain the number of outgoing blocked calls only, or the number of incoming blocked calls only, but not both. For these cases, we proposed to require that the blocked-call count be doubled to compensate for the missing data, unless the carrier certifies that only one direction of the call set-up was affected by the outage. We sought comment on this proposed rule.

94. *Comments.* BellSouth and ATIS oppose what they categorize as our apparent shift away from using blocked calls for determining whether tandem outages are reportable.[286] Sprint asserts that only the calls that are blocked in the first 30 minutes of an outage should be counted as blocked calls for purposes of triggering the requirement to file an outage report.[287] Other commenting parties contend that our proposal has inaccurately categorized blocked calls as either "originating" or "terminating" and that it would be more appropriate to categorize blocked calls as either "outgoing" or "incoming."[288] Several

[283] 47 C.F.R. § 63.100(g) (emphasis supplied). This subsection further provides that: "[c]arriers may use historical data to estimate blocked calls when required real-time blocked call counts are not possible. When using historical data, carriers must report incidents . . . where more than 30,000 calls are blocked during a period of 30 or more minutes for purposes of complying with the 30,000 potentially affected customers threshold."

[284] For example, if 70,000 calls were carried during the historical period, the assumption would be made for reporting purposes that 70,000 calls would have been carried during the outage.

[285] The proposed multiplicand of three is based on the total number of times (three) that an average subscriber would attempt to redial a number after first not being able to complete a telephone call. *In the Matter of Amendment of Part 63 of the Commission's Rules to Provide for Notification by Common Carriers of Service Disruptions,* CC Docket No. 91-273, *Second Report and Order,* 9 FCC Rcd 3911, 3914 at ¶ 14 (1994). Providers should use larger multiplicands for determining whether the outage should be reported if their experience has been that three is too small a number (*i.e.,* that their subscribers try, on average, to redial a number more frequently than three times after first not being able to complete a telephone call). Thus, if 70,000 calls were carried during the historical period, the assumption for reporting purposes would be that each of those calls would have been attempted three times, which means that 210,000 calls would have been blocked during the outage.

[286] BellSouth Comments at 12-13; ATIS Comments at 19.

[287] Sprint Comments at 17.

[288] BellSouth Comments at 12; AT&T Comments at 15; SBC Comments at 8

commenting parties claim that our proposal to count both originating and terminating blocked calls would result in an unfair double counting of blocked calls.[289] A number of commenting parties contend that the threshold based on real-time blocked calls should not be triple the threshold that is based on historical carried calls.[290] MCI states that the reporting requirements for tandem outages should be expanded to cover all "network" outages, so that outages involving transport facilities would also be covered.[291]

95. *Discussion.* We believe that there is some confusion about our proposal. Contrary to the comments of several entities, we are not using assigned telephone numbers as the basis for determining if a tandem outage is reportable. Instead, we are using blocked calls. We disagree with commenting parties who object to our proposal to triple the number of historic carried calls to determine if an outage is reportable. We believe that setting the threshold for real-time blocked calls equal to triple the threshold using the number based on measured historic carried calls is still appropriate. This is not a change in the Commission's position. The existing rule, as it always has, states:

> Carriers must report IXC and LEC tandem outages . . . where more than *90,000 calls are blocked* during a period of 30 or more minutes for purposes of complying with the 30,000 potentially affected customers threshold. Carriers may use historical data to estimate blocked calls when required real-time blocked call counts are not possible. *When using historical data,* companies, corporations or entities must report incidents . . . where more than *30,000 calls are blocked* during a period of 30 or more minutes for purposes of complying with the 30,000 potentially affected customers threshold.[292]

One can logically infer that there are more call attempts when outages occur. This implies that there should be a conversion factor when using real-time information instead of historical information. In the early 1990s, ATIS Committee T1A1.2 used a factor of three in its recommended methodology.[293] This resulted in the existing threshold of 90,000 for real-time blocked calls. If we follow the suggestion of certain commenting parties and eliminate the factor of three, the threshold for real-time blocked calls would be 30,000 blocked calls – the same as the threshold for historical carried calls. We find that this would be an unsupported deviation from the existing rule and would disserve the public interest.

96. We strongly disagree with Sprint's recommendation[294] that we limit the counting of blocked calls to those that occur in the first 30 minutes of an outage. This would result in a severe and unjustified undercount of the effects of outages. Thus, many severe outages would not be reported. Most outage reports that the Commission receives and which have been triggered by blocked calls are the result of cable failures; these outages can persist for hours and even days.[295] Regarding the "originating" and

[289] USTA Comments at 21; Verizon Comments at 15; BellSouth Comments at 13-14; AT&T Comments at 17; SBC Comments at 8; Sprint Comments at 16; Qwest Comments at 8; ATIS Comments at 20.

[290] USTA Comments at 21; GCI Comments at 4; WilTel Comments at 10; Verizon Comments at 15; BellSouth Comments at 13; AT&T Comments at 16-17; ATIS Comments at 21.

[291] MCI Comments at 4.

[292] Section 63.100(f) of the Commission's rules and regulations, 47 C.F.R. § 63.100(f) (emphases added). When referring to historical data, for which 30,000 "historic carried calls" is the appropriate criterion, the existing rule inaccurately refers to 30,000 "calls [that are] blocked." This is so, because in the historic period, all calls were presumably carried and none were "blocked."

[293] ATIS Committee T1A1.2 Technical Report #42 at 12.

[294] Sprint Comments at 17.

[295] For example, in its final report for the September 11, 2001 outage in New York City, AT&T reported that the number of blocked calls was "ongoing" 30 days after the start of the outage.

"terminating" terminology that we have historically applied to blocked calls, we acknowledge that for tandem switches the terms "incoming" and "outgoing" would serve just as well. Our paramount goal is to ensure that all effects of outages are counted. For outages of tandem switches, all blocked calls need to be counted. Since any call incoming to a tandem switch is also outgoing from that tandem, the number of blocked calls can be counted by determining the number of blocked incoming calls or by determining the number of outgoing blocked calls. That is, there is no need to double either figure or to add them together. For failures of interoffice facilities, blocked calls also need to be counted. Many interoffice facilities carry traffic in both directions. In this case, if the number of blocked calls in only one direction can be determined, then the estimate of the number of blocked calls for both directions must be obtained by doubling that number. Our proposal, when interpreted and applied in this manner, will not result in the double counting of blocked calls but will accurately count the number of all blocked calls.[296] Therefore, we adopt our proposal. Additionally, we clarify that whenever a provider relies on available "historical data," it must use historic carried call load data for the same day of the week and the same time of day as the outage, and for a time interval not older than 90 days preceding the onset of the outage. Finally, we must account for situations where, for whatever reason, real-time and historical data are unavailable to the provider, even after a detailed investigation. In such cases, the provider must determine the carried call load based on data obtained in the time interval between the onset of the outage and the due date for the final report; this data must cover the same day of the week and the same time of day as the outage. Justification that such data accurately estimates the traffic that would have been carried at the time of the outage had the outage not occurred must be available on request.

V. Outage Reporting Requirements for Wireless and Paging Communications

A. Common Metric for Paging and Wireless Services

97. Consistent with the 30 minutes/900,000 user-minutes criteria discussed above, we proposed to require wireless service providers to report outages of at least 30 minutes duration that potentially affect 900,000 user-minutes. We sought comment on this proposal. While we believe in the importance of a common metric that is based on outage impact on people irrespective of the communications system involved, we also sought comment on possible alternative criteria that would yield outage data that would be useful in developing best practices. Paging remains an important technology for emergency responders, and we therefore proposed to include paging service providers within the scope of the outage reporting requirements for wireless service providers. For those paging networks in which each individual user is assigned a telephone number, we proposed to define an end user as an assigned telephone number, and the number of potentially-affected user minutes would be the mathematical result of multiplying the outage's duration (expressed in minutes) by the number of potentially-affected assigned telephone numbers. It is our understanding that for other paging networks in which a caller must first dial a central number (*e.g.*, an "800 number") and then dial a unique identifier for the called party, the paging provider maintains a database of identifiers for its end users and would therefore know how many of its end users are potentially affected by any particular outage. The number of potentially-affected end users for those paging networks would simply be the mathematical result of multiplying the outage's duration (expressed in minutes) by the number of end users potentially affected by the outage. We sought comment on this interpretation and proposed addition to our rules. We also sought comment on whether there are alternative approaches for measuring the extent of the impact of the outage of CMRS paging networks. For other wireless services, we acknowledged, the determination of the number of potentially affected users could be more complex.

[296] This takes into account the concern about outages of transport facilities, which was raised by MCI. See *supra* ¶ 94 & n.291.

98. *Comments.* BloostonLaw Paging Group, SBC and MCI (Skytel) object to the proposed reporting requirements for paging providers and alternatively propose annual outage reporting, regional outage reporting, reporting those particular outages of a suspicious origin, and voluntary outage reporting through ILORI.[297] They oppose the application of our proposed metric of 900,000 user-minutes to paging operations because of the broadcast nature of paging, by which several transmitting facilities simultaneously broadcast the same paging message. In addition, most of the paging networks are one-way and, they state, there is no way to tell if messages are received. AAPC urges the Commission to establish a staff/industry working-group to develop appropriate and realistic guidelines for the paging industry to use in determining whether to file reports in particular cases.[298] DHS generally shares the Commission's view that a consistent reporting method and metric has merit. However, DHS also supports, where necessary, the appropriate tailoring of the threshold criteria to account for significant differences among the various communications platforms to ensure that the reporting information obtained from all providers will be relevant and useful for analytical purposes.[299]

99. *Discussion.* We adopt outage reporting requirements for paging providers because of paging's vitally important role in alerting first responders and other critical personnel in emergencies, as well as its general importance as part of our Nation's telecommunications infrastructure. Nonetheless, we recognize that paging users are highly mobile, and there is no way to predict accurately how many users will be at specific locations at any particular time. Therefore, we are adopting modified outage-reporting threshold criteria for paging to account for its unique characteristics. We find that the key, common element in paging networks is the switch. All messages are processed through a single switch before being distributed for broadcast. In addition, most paging switches have large numbers of users assigned to them. Therefore, if the switch cannot receive messages or distribute them to the transmitters, all assigned users are potentially affected. On the other hand, we find that it would be difficult to determine the number of potential users affected by the failure of one or more transmitters. Also, a failure of a single transmitter would not cause a service outage if the paging messages were successfully completed through the use of other transmitters. Therefore, we find that the proposed 900,000 user-minute reporting threshold is applicable only to failures of the switch,[300] and not to failures of individual transmitters. If the switch is incapable of processing paging messages for at least 30 minutes and at least 900,000 user-minutes are thereby potentially affected, then the paging provider will be required to report the outage to the Commission.

B. Related Criteria for Wireless Communications

100. To measure the extent of wireless services system degradation, we proposed to require the use of blocked calls instead of using assigned telephone numbers as a proxy for the usefulness of the system to users.[301] In the wireless telephony service, a call is deemed "blocked" whenever the MSC[302]

[297] BloostonLaw Paging Group Comments at 11; SBC Comments at 14; MCI Comments at 1.

[298] AAPC Reply Comments at 3.

[299] DHS Comments at 2.

[300] As used here, the term "switch" refers to any terminating device used by a paging provider to receive incoming page requests.

[301] "Degradation" differs from the term "outage" in that it connotes a reduction in the quality of service that could be perceived by some (but not necessarily all of the) users as a total outage.

[302] "MSC" is an acronym for Mobile Switching Center, which is also frequently referred to as a Mobile Telephone Switching Office, or MTSO. The MSC coordinates calls among cells, participates in Signaling System 7 switching, and serves as a point of aggregation for calls originating from a group of cell sites and as a point for distribution of incoming calls to individual cell phone subscribers.

cannot process the call request of an authenticated, registered user. Call blocking can result from a malfunction or from an overloaded condition in the wireless service network. Usually when calls are blocked, users newly attempting to access the system cannot be registered on the system until the underlying problem is corrected. Because wireless service networks typically provide user access through several MSCs, an outage on a single MSC affects only those subscribers served by that MSC. Accordingly, under our proposal, call blocking on a single MSC would be reportable if it were to result in an outage of at least 30 minutes duration that meets or exceeds the 900,000 user-minute criterion.

101. To estimate the number of potential users affected by a significant system degradation[303] of wireless service facilities, we proposed to require providers to determine the total call capacity of the affected MSC switch (or, in the case of a MSC that has more than one switch, the total call capacity of all switches in the affected MSC) and multiply the call capacity by the concentration ratio.[304] Although the concentration ratio may vary among MSCs, we tentatively concluded that, on average, the concentration ratio used for determining the outage reporting threshold should be uniform to facilitate correlative analyses of outage reports from different wireless providers. Based upon discussions with telecommunications engineers and our understanding of typical traffic loading/switch design parameters, we proposed that the concentration factor be ten.[305] Thus, a MSC switch that is capable of handling 3,000 simultaneous calls would have 30,000 potentially affected users (*i.e.*, (3,000) x (10) = 30, 000). We tentatively concluded that this proposed concentration factor should adequately account for those users that are in the service area of the MSC and are thus eligible for immediate service. This factor would also take into account users that are assigned to the local home location register database for the MSC as well as potential visitors.[306] Thus, under the general outage-reporting criteria that we proposed, wireless service providers would be required to report MSC outages of at least 30 minutes duration that potentially affect at least 900,000 user-minutes. The 900,000 minutes were calculated by multiplying the number of simultaneous calls the MSC can complete through the switch by the concentration ratio of 10, and then multiplying the result by the duration of the outage expressed in minutes. In the case of the preceding example, the calculation would be 3,000 multiplied by 10, or 30,000 users. 30,000 users multiplied by 30 minutes would equal 900,000 user minutes (30). That is, 3,000 (user switch capacity) multiplied by 10 (concentration ratio) equals 30,000 (number of potentially affected users). Then, 30,000 (number of potentially affected users) multiplied by 30 minutes (outage duration) equals 900,000 user-minutes. If the outage were to involve less than the full capacity of the switch, then that portion of the traffic that is disrupted would be calculated. For example, if a 3,000 user switch were operating at one-half of its capacity for one hour, during which the switch could simultaneously serve a maximum of only 1,500 users, , then the calculation would be 1,500 users multiplied by 10 = 15,000 potentially affected users. Then, 15,000 potentially affected users multiplied by 60 minutes would equal 900,000 user-minutes. This outage would meet the threshold and, therefore, would be required to be reported. We sought comment

[303] Section 63.100(a)(1) of our rules defines an "outage" as a "significant degradation in the ability of a customer to establish and maintain a channel of communications as a result of failure or degradation in the performance of a carrier's network." 47 C.F.R. § 63.100(a)(1).

[304] Concentration is based on the premise that not all users eligible to place and receive calls on a particular switch do so simultaneously. Accordingly, more users can be assigned to a switch than the actual capacity of that switch. The concentration ratio is the quotient of the number or users eligible for service from a particular MSC switch at any given time divided by the call capacity of the switch. A concentration ratio of 10-to-1 means that for every ten users eligible to access service from a particular switch there is one communication channel available to handle calls. This ratio and similar ones are frequently used in the design of cellular system architectures.

[305] *See* Bellamy, John, *Digital Telephony*, 2nd ed., John Wiley and Sons (2000) at 234, for a description of call blocking and the development of a concentration ratio.

[306] "Visitors" are wireless service users whose transceivers are active in areas that are not served by the physical facilities of their particular service provider.

on this proposed addition to our rules and on whether there are specific types of wireless networks for which a concentration factor other than ten should be applied. As with CMRS paging providers, we also sought comment on possible alternative criteria for wireless service providers and approaches to measure the extent of the impact of system degradation that would yield useful outage data on which to base the development of best practices.

102. We further proposed to require the filing of an outage report whenever a MSC is incapable of processing communications for at least 30 minutes, without regard to the number of user-minutes potentially affected by the outage. Our reason for this specific proposal on MSC-outage reporting was based on our continuing need to be aware of the underlying robustness, as well as the overall reliability, of wireless networks. The MSC, in this regard, is a critical architectural component in wireless networks that is designed to address significant levels of traffic aggregation and call routing that is dependent upon SS7 signaling. We sought comment on these additional conclusions and further proposal.

103. *Comments.* American Mobile Telecommunications Association, Inc. ("AMTA") requested that we clarify that only those Specialized Mobile Radio Services ("SMR") providers that meet the definition of "covered CMRS" service provider, pursuant to Sections 20.18(a), 52.21, and 52.31 of the Commission's Rules, will be made subject to outage-reporting requirements.[307] BloostonLaw Rural Carriers ("BRC") request clarification of the term "significant degradation" as it applies to wireless communications outages.[308] In addition, BRC states that the proposed concentration ratio would over count users in rural areas. Commenting wireless parties disagree with our proposed use of a concentration ratio to determine the number of potential users affected by an outage. Thus, for example, CTIA states that the use of a concentration ratio would greatly overestimate the effect of any outage in the wireless environment and therefore should be rejected as inappropriate for calculating the impact of an outage. Instead, CTIA suggests that historical data should be used to determine the number of users affected by an outage.[309]

104. Qwest also challenges the proposed use of a concentration ratio and states that "[w]ireless switches are not designed or 'sized' in this manner. Instead wireless switches are designed by performing a complicated analysis that evaluates numerous factors to determine the peak number of user minutes that may be expected at any time."[310] Cingular states that "[m]any wireless users turn off their devices when incoming calls would distract others, such as in restaurants, meetings and concerts. These customers would be invisible to the wireless switch."[311] Nextel argues that the concentration ratio is "a wireline concept that does not translate to CMRS applications. In particular, the concentration ratio is typically used for class 5 end offices.... and denotes fixed serving arrangements between two points in the wireline network. In contrast, MSC traffic designs are based on traffic load between and among numerous points in the network, and directly correlate with peak busy, call duration, call attempts, calling traffic patters and other design characteristics."[312]

105. Sprint also challenges the use of MSC switch capacity and a concentration ratio to calculate the number of users potentially affected by an outage. It argues that unlike wireline networks,

[307] AMTA Comments at 1, 3-4, citing 47 C.F.R. §§ 20.18(a), 52.21, 52.31.

[308] BloostonLaw Rural Carriers Comments at 4, 7.

[309] CTIA Comments at 12.

[310] Quest Comments at 10.

[311] Cingular Comments at 15.

[312] Nextel Comments at 10.

call capacity on a wireless network is extremely fluid. The number of calls that a particular MSC can handle is dependent upon a number of variables including (1) the number of base stations (or cell sites) that subtend the switch; (2) the number of carriers (*i.e.*, radio frequencies) that have been deployed or are available; (3) the type of handsets the particular end users currently on the system are employing (*e.g.*, 2G handsets impose greater capacity demands on the network than 3G handsets, handsets with different vocoder bit rates demand different capacity); and (4) the capacity of the Base Station Controller to manage mobile call hand-off. Moreover, Sprint adds, the capacity of any particular switch varies over time as new cell sites, carriers, or upgraded processing are added.[313] Sprint also states that the fluid nature of the RF portion of wireless networks makes it difficult to determine system reliability. It explains that RF voice channels are not static and do not equate to twisted pairs connected to a wireline switch. The mobility of wireless and the changing RF environment could require a user over the course of a call to use several different voice channels from several different cell sites. Thus, Sprint proposes that any wireless outage-reporting threshold should be based on call blocking.[314] Qwest also stresses that "[t]here are a variety of different radio frequency technologies used in wireless networks – AMPS, NAPMS, GSM, TDMA, CDMA, *etc.* It is difficult to derive common measurements used across these radio technologies."[315] Qwest adds that any calculation of the number of potentially affected users is complicated by the fact that wireless phones are designed to "roam" to an alternate switch when blockage occurs. If the MSC were blocked, a user could travel some distance to an adjacent, unblocked MSC and make a call on the Qwest network.[316] The number of roaming agreements among service providers is increasing; however, in order to access another provider's network the handsets must be compatible. Thus, although several service providers may provide overlapping service in a specific geographic coverage area, there is no guarantee that a user on one network can access the other wireless networks.

106. In addition, Nextel suggests that the proposed rules, as set forth in Appendix A to the *Notice*, should be revised to make them more substantively consistent with the proposals set forth in paragraph 38 of the *Notice*.[317] Nextel asserts that the threshold of 900,000 user minutes, the requirement to report MSC outages of at 30 minutes duration, and the requirement to report outages that potentially affect 911 special facilities are inconsistent.[318] Finally, CTIA urges that planned wireless MSC outages should not be required to be reported.[319]

107. *Discussion.* We adopt AMTA's suggestion that only those SMR providers that meet the definition of "covered CMRS" providers be required to submit outage reports. As explained in the *Notice*,[320] our intent is to include SMR providers that offer services interconnected with the PSTN and compete with cellular and PCS services. We believe that AMTA's proposal accurately depicts the SMR services to which we intend to apply outage-reporting requirements. We also find that there is a public interest need to determine the potential number of users that may be affected by an outage. As explained in the *Notice* the current trend is for wireless users to replace their landline telephones with wireless

[313] Sprint Comments at 23.

[314] Id. at 24.

[315] Qwest Comments at 10.

[316] Id..

[317] *See* Nextel Comments at 9.

[318] Id.

[319] Most commenting wireless industry parties oppose mandatory outage-reporting requirements; instead they propose voluntary reporting and support the ILORI initiative. We have considered this argument but for reasons previously explained have found that this alternative would not serve the public interest. See *supra* ¶¶ 32-39.

[320] *Notice, supra* note 1, at ¶ 14 & nn.30, 38, 40.

service. RCR Wireless reports that the number of U.S. households that have completely cut the cord remains small.[321] However, half of the wireless households report that wireless usage has replaced some, a significant amount or all of their regular telephone usage.[322] In addition, wireless service providers are offering flat rate calling plans that encourages users to approximate wireline-calling patterns. Similar to wireline, there are many users who seldom make or receive wireless telephone calls, their main intent is to have communications available in case of an emergency. This reliance on wireless for emergency communications has reportedly increased in the wake of the September 11, 2001 terrorist attacks.[323] In addition, in the immediate aftermath of these terrorist attacks, the volume of wireless communications traffic reached saturation levels, causing several wireless networks to become overloaded. In such situations, it is clear that the alternative proposed by some commenting parties, that we rely on either real-time or historical blocked call counts to determine whether an outage has reached the reporting threshold, would result in severe undercounts of the number of users that would have likely relied on wireless phones to attempt calls to reach emergency assistance or loved ones. Therefore, we find it imperative that the outage-reporting threshold rely on a more realistic method for calculating the number of users potentially affected by a wireless outage. The impact of an outage on the Nation's infrastructure and the growing reliance of first responders on wireless communications make the reporting of the number of potential users affected imperative to determine the robustness of the nation's wireless infrastructure. Some commenting parties have presented arguments that the concentration ratio as described in the *Notice* is an inappropriate method of estimating the number of potential users affected by a wireless network outage. Although concentration ratios vary among MSCs, we believe that, on average, the concentration ratio used for determining outages should be uniform to facilitate correlative analysis of outage reports from different wireless providers. Based on discussions with telecommunications engineers and our understanding of typical traffic loading/switch design parameters, we proposed that the number be 10.

108. We conclude, however, that the concentration ratio should be reduced to 8 to account for the dynamic nature and the mobility of wireless telephony systems. The proposed concentration ratio of 10 was based on an analysis that assumed a presented load of 0.05 Erlangs/user, which is half the load presented to a typical wireline switch.[324] We believed this assumption was justified in light of the fact that wireless phones, while gaining considerably in popularity, are still not complete substitutes for wireline telephone service. For example, because wireless users tend to be aware of remaining battery life, they may tend to shorten the average duration of their calls. Wireless calls can also terminate prematurely due to the uncertain nature of wireless coverage areas and dead spots. However, despite these issues, more recent information[325] leads us to believe that more users are considering wireless service to be a complete substitute for wireline local exchange service, where issues like coverage area and battery life would weigh less on the average call duration, and that this trend is likely to continue. Hence, we find that our original assumption about the average load presented to a typical wireless switch was low but could increase in the future. After increasing the assumed presented load to a more realistic

[321] *See* "Wireless users turn away from landline long distance," *RCR Wireless*, March 23, 2004, available at www.rcrnews.com.

[322] Id.

[323] Carrico, Lydia, "Cell phone sales up after attack," September 25, 2001, Messenger Inquirer.com 25, available at http://www.messenger-inquirer.com/news/attacks/3596724.htm ("Since the September 11 attack on the United States, when passengers aboard the hijacked airplanes called family members to say goodbye, more area residents are snatching up their own cell phones to use in emergency situations.").

[324] *See* Bellamy, John C., *Digital Telephony*, 2nd ed., John Wiley and Sons (2000) at 241.

[325] *See, e.g.*, "SBC/BLS More Vulnerable than VZ Because of Pending AWE Merger," Precursor, August 3, 2004 at 1.

level, we conclude that the concentration ratio should be reduced to 8. Thus, a MSC switch that is capable of handling 3,750 simultaneous calls would have 30,000 potentially affected users (*i.e.*, (3,750) X (8) = 30,000).

109. The comments help illustrate the complexities of developing a common method to estimate the number of potential users affected by an outage. The use of historical data will only account for the normal usage patterns of the MSC. Once a MSC is overloaded or is out of service there is no mechanism to count blocked calls. As a consequence, reliance on historical data would result in a gross underestimate of the number of roamers and the number of users who only use their wireless phones in an emergency. This underestimation of potential users through the use of historical data has been repeatedly illustrated during emergencies in which wireless usage has overloaded wireless networks. As the BloostonLaw Rural Carriers concede, when a switch fails, all users assigned to the switch are potentially affected. [326] We conclude that outage reports should account for all potential users, not just those users who normally use their phones.

110. The concentration ratio of 8 reflects the generic parameters that are routinely used in basic telecommunication traffic analysis. In practice, cellular and PCS networks strive to maintain not more than 2% blocking.[327] The wireless design goal is to accommodate 2% blocking of calls during the busy hour. Similar statistical calculations are used to determine wireline switch capacity.[328] During an *ex parte* meeting held on June 10, 2004, discussions with CTIA and other representatives of the cellular industry confirmed that wireless networks are designed to not permit more than 2% blocking during the busy hour.[329] This means that, on average, during the switch's busy hour, 2% of all calls presented to the switch will be blocked and 98% will be completed. Based on application of the 2% blocking factor and commonly accepted switch design parameters and principles as described above,[330] we find, first, that use of a concentration ratio to determine the call capacity of MSC switches is appropriate. Second, we find that the choice of 8 as the concentration ratio for determining the wireless outage–reporting threshold is also appropriate.

111. Also discussed at the June 10, 2004 *ex parte* meeting was the dynamic nature and environment of the RF[331] portions of wireless networks. We agree with Sprint[332] that the RF portions of wireless networks are time variant and operate in dynamic environments that make evaluation of failures within the RF portion of wireless networks more difficult. In order to avoid those difficulties, we

[326] BloostonLaw Rural Carriers Comments at 7.

[327] *See* Levine, R., Digital Switching Lecture, March 23, 2004, at 37, available at http://engr.smu.edu/Levine/ee8304/dmaswt4.ppt.

[328] *See* Bellamy, John, *Digital Telephony*, 2nd ed., John Wiley and Sons (2000) at 234, for a description of call blocking and the development of a concentration ratio. In fact, for many years, wireline system designs have been bases on a more stringent blocking factor, namely, a maximum of 1% blocking in the busy hour of the busy season. See Telcordia Notes on the Networks, SR-2275, Issue 4, October 2000, Section 4.5.1.2.

[329] The *ex parte* meeting was held on June 10, 2004, and, on June 14, CTIA filed notice of the meeting. The attendees from outside the Commission were Chris Guttman-McCabe, CTIA; Rick Kemper, CTIA; Michael Fingerhut, Sprint; David Jatlow, AT&T Wireless; Jim Bugel, Cingular; and Lee Fitzsimmons, Nextel. Representing the Commission from the Office of Engineering and Technology were Jeffery Goldthorp, Kent Nilsson, Charles Iseman, Whitey Thayer, John Healy, Paul Marrangoni, and Shanti Gupta.

[330] *See* ¶ 108, *supra*.

[331] "RF" (an acronym for Radio Frequency) refers to the radio portions of each wireless communication.

[332] Sprint Comments at 24 (the fluid nature of the RF portion of wireless networks makes it difficult to determine system reliability).

conclude that the MSC switch is the point at which wireless communications outages should be measured. The MSC switch, like a wireline switch, operates in a stable, controlled environment and easily accommodates the measurement of call connections potentially lost during an outage. When a call is established through the MSC switch, there is a single switch connection used for the duration of the call as long as that user is located within the MSC serving area. Thus, by using the switch as the basic element to calculate potential users, the computational difficulties that result from the fluidity of the RF portions of each wireless network are avoided. If the RF portion of the network were to increase in capacity, the switch would require upgrading to maintain the same level of service (i.e., 2% or fewer calls being blocked during the average busy hour).

112. Several commenting parties have urged that a MSC switch and a wireline switch are totally different in design and function. We recognize that MSC switches have more assigned tasks than do wireline switches (*e.g.*, tracking mobiles as they move about the network's cell sites, coordinating handoff, and monitoring signal strength). These are, however, ancillary functions performed by computers and data processing elements located at the MSC. The circuit switch part of a MSC is very similar if not identical to a wireline switch, and the MSC's traffic management function is based on the same statistical methods. Thus, the switch capacity of a MSC is a stable element on which to calculate the number of users potentially affected by an outage.

113. In our opinion, application of a concentration ratio of 8 will result in the closest overall approximation of the number of potential users per MSC switch for voice calls. As was the case in our development of an outage-reporting threshold for wireline communications, we acknowledge that not all potential users (here, wireless users) actually use their phones at any specific time. For example, in the evening it is very unlikely that most office phones are used. Likewise, during the day many residential users are not at home. As Qwest has pointed out, wireless networks are not designed to enable all eligible users to complete calls simultaneously. The same is true of wireline switches. We understand that a concentration ratio of 8 may overestimate the potential users on some wireless networks, and underestimate them on others, but that have concluded that it would be unnecessarily burdensome to require each provider to develop an individual concentration ratio for each MSC. We have carefully considered, but disagree with, the argument of the BloostonLaw Rural Carriers that our proposal will result in over counting users in rural areas. The capacity of MSC switches is designed to handle the number of users that originate and terminate calls at the MSC. MSC switches with smaller capacities would normally be deployed in rural areas that have fewer users. Moreover, there is no evidence that rural wireless networks apply anything other than the 2% blocking factor that is typical in wireless system designs. As a consequence, we conclude that application of a concentration ratio of 8 in determining the call capacity of MSC switches will not result in over counting users in rural areas. Finally, we find that the use of a common concentration ratio for all wireless networks will provide consistency, will be easy to understand and use, and, in turn, will best serve the public interest. In sum, we adopt a common concentration ratio of 8 based on our best engineering judgment as applied to the record before us. This concentration ratio corresponds to a service level approximately equal to a 2% blocking factor, for which wireless networks are designed. Accordingly, we adopt our proposed method of determining the call capacity of a MSC, that is, the number of potential users = (MSC switch capacity) X (the concentration ratio of 8). We recognize, however, that this concentration ratio may change over time. As a consequence, we direct the Chief, Office of Engineering and Technology, to monitor the numerical value of the concentration ratio and advise the Commission if this value needs to be revised to more adequately reflect the number of potential users that are impacted by an outage.

114. We disagree with Nextel's assertion that the proposed rules are inconsistent. The threshold of 900,000 user-minutes could be reached even when a MSC is not totally out of service. Conversely, small MSCs could be out of service for a considerable time without triggering the outage-reporting threshold. Finally, we reject the contention that planned outages should not be reportable and conclude that, regardless of the reason for it, any outage that meets the threshold must be reported.

Wireless communications providers are encouraged to seek alternative means of accomplishing maintenance that do not require taking the MSC or the entire switch out of service. In taking these actions, we give due recognition to the fact that wireless and paging services among the primary means of contacting essential personnel, such as doctors, and nurses, during an emergency. In addition, the departmentalized first responders (police, fire and EMS) use wireless communications to augment their public safety communication systems. The public is also becoming increasingly reliant on wireless communication for emergencies, as well as their routine communications. Taking these facts into account, we conclude that our actions herein will best the serve the public interest.

VI. Outage Reporting Requirements for Cable Circuit-Switched Telephony

115. Failures in various portions of cable network infrastructures[333] can cause disruptions to cable circuit-switched telephony service. For example, failures within the cable distribution plant, the fiber distribution plant, cable headend systems, and voice terminating equipment, as well as failures within Local Exchange Carrier ("LEC") facilities such as switches and other points within the Public Switched Telephone Network ("PSTN") can cause cable telephony to be disrupted.[334] Circuit-switched telephony provided by cable operators has always been subject to our communications disruption reporting requirements, and outage reports have been filed by cable operators.[335] Nonetheless, we proposed to amend Section 63.100 to make it explicitly clear that cable circuit-switched telephony is subject to our service disruption reporting requirements. The current thresholds for reporting cable telephony outages are the same as those for wireline telephony -- outages must last at least 30 minutes in duration and potentially affect at least 30,000 customers. We proposed to apply to cable telephony the same revised threshold reporting criteria (30 minutes/900,000 assigned telephone number-minutes potentially affected) that we proposed for wireline telephony outage reporting and sought comment on this proposed addition to our rules.

116. *Comments.* Several commenting parties support the proposed rule for circuit-switched telephony provided by cable operators.[336] A few commenting parties suggest that the outage-reporting requirements be extended to include Voice over Internet Protocol (VoIP) service provided by cable operators[337] or generally to all communications providers,[338] while others[339] oppose this suggestion and

[333] "Cable system infrastructure" refers to the physical paths, switches, routers, and databases that the cable system operator uses to provide connectivity for its subscribers to the PSTN (in the case of cable telephony).

[334] Of course, failures that occur outside of the cable infrastructure (*e.g.*, at the switch or elsewhere within the PSTN) are also covered by the outage reporting requirements as they relate to the communications provider whose facility failed.

[335] Section 2(a) of the Act states that cable service is subject to the provisions of the Act, 47 U.S.C. § 152(a), and Subsections 621(b) (3) and (d) of the Act state that cable service providers may provide telecommunications services but these services are outside the scope of the regulatory provisions of Title VI of the Act, 47 U.S.C. § 621(b) (3) and (d). Cable circuit-switched telephony providers fall within the definition of telecommunications carriers, which have always been subject to the requirements of Section 63.100 of the Commission's Rules, 47 C.F.R. § 63.100.

[336] For example, the City of New York, National League of Cities, and National Association of Telecommunications Officers and Advisors jointly state that they "endorse the NPRM's proposals to (1) revise and strengthen the Commission's current service disruption reporting requirements, and (2) extend those requirements to wireless, cable circuit-switched telephony, and satellite communications service providers." Other commenting parties that support the proposed rule for circuit-switched telephony over cable include DHS, CDPUC, NTCA, and KCC.

[337] City of New York *et al.* Comments at ii, 10.

[338] NTCA Comments at 2; KCC Comments at 2; ITTA Comments at 6. See also DHS Comments at n.15 (As the volume of traffic carried on a VoIP basis continues to expand, the Internet will commensurately become a more (continued....)

state that this issue should instead be addressed in the pending proceeding on IP-enabled services. No comments were filed by any cable providers or by their industry associations.

117. *Discussion.* We adopt our proposed outage-reporting requirements for cable communications providers. We note that the customer base for circuit-switched telephony over cable may not be as large as the one over wireline and, hence, few cable outages might be reported. However, the reporting threshold that we adopt will capture outages when they are sufficiently long and is a more stringent threshold than the existing one. We do not find that the needs of homeland security warrant a different action at this time. Also, as we stated in the *Notice*,[340] we are not addressing VoIP or public data network outage reporting at this time.[341]

VII. Outage Reporting Requirements for Satellite Communications

118. Section 63.100 of our rules does not contain outage-reporting requirements that are applicable to satellite communications.[342] We tentatively concluded, however, that because of the increasing role and importance of satellites in our national communications infrastructure, it would be prudent to require U.S. space station licensees and those foreign licensees that are providers of satellite communications to the American public to report all major failures. This would apply to satellites or transponders used to provide telephony and/or paging. Thus, our proposal did not include satellites or transponders used solely to provide intra-corporate or intra-organizational private telecommunications or solely for the one-way distribution of video or audio programming.

119. Satellite communications have space components and terrestrial components. The reporting requirements that we proposed cover all satellite communications outages, regardless of whether they result from failures in the space or terrestrial components. Specifically, we proposed to require the reporting of any loss of complete accessibility to a satellite or any of its transponders for 30 minutes or more. Such outages could result, for example, from an inability to control a satellite, a loss of uplink or downlink communications, Telemetry Tracking and Command failures, or the loss of a satellite telephony terrestrially-based control center, and we regard such outages to be major infrastructure failures. Analogous to the cases of wireline, wireless, and cable communications, we also proposed to

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(...continued from previous page)
important part of the telecommunications infrastructure. Therefore, the Commission should revisit the topic of Internet outage reporting in the future as the nature, criteria, and most appropriate mechanisms for addressing the IP-based infrastructure become clearer.).

[339] AT&T Reply Comments at 20-21; SBC Reply Comments at 4; Qwest Reply Comments at 16 n.47.

[340] *Notice, supra* note 1, at ¶ 2 n.4.

[341] DS-3 reporting requirements should enable us to understand, more fully, service disruptions that occur throughout the fabric of our Nation's telecommunications infrastructure. See *infra* Section VII.B. To the extent that DS-3 communications carry many different forms of communications (e.g., analog voice and video, digital voice and video), there may, on occasion, be DS-3 service disruption reporting by cable, wireline, and wireless service providers that includes transmission paths that support public data networks.

[342] Satellite licensing and several technical portions of our rules require the limited disclosure of information on some satellite outages in the context of determining the extent to which the electromagnetic spectrum is being used efficiently. *See* 47 C.F.R. §§ 25.142(c), 25.143(e), 25.144(c), 25.145(g), 25.149(b), and 25.210(k). With the exception of the requirement that those Mobile Satellite Service (MSS) licensees using ancillary terrestrial components (which use spectrum terrestrially) must report certain outages within 10 days of their occurrence (47 C.F.R. §§ 25.149(b)(2)(iii)), these rules require the filing of reports on an annual basis. As a consequence, these rules do not provide for the prompt and detailed disclosure of information that is needed to develop best practices and assure that satellite telecommunications infrastructures and networks are reliable and secure.

require the reporting of the loss, for 30 minutes or more, of any satellite link or its associated terrestrial components that are used to provide telephony and/or paging, whenever at least 900,000 user-minutes are potentially affected.[343] We requested comment on this proposed addition to our rules.[344]

120. We noted that Part 25 of the Commission's Rules provides that certain satellite licensees file annual reports that contain some information on outages and that Mobile-Satellite Service (MSS)[345] Ancillary Terrestrial Component (ATC) licensees report certain outages within 10 days of their occurrence. These rules were adopted to provide the Commission with information necessary to assess the commercial and technical development of satellite services, including the efficiency of spectrum utilization by satellite licensees,[346] and, in the case of MSS ATC licensees, to ensure that the terrestrial use of spectrum remains ancillary to satellite use.[347] We tentatively concluded that our proposed additional reporting requirements were necessary so that we can more rapidly acquire information that would be more useful in achieving our objectives of increasing reliability and security in satellite communications. We sought comment on these proposals and on alternative ways to accomplish our objectives in this proceeding while minimizing any duplication of reporting requirements or unnecessary burdens on satellite communications providers.

[343] We anticipated that the satellite provider's Network Operations Center would be aware of the loss of satellite system components and their potential impact on end users. For telephony and many paging networks, one user-minute would be defined as one assigned telephone number-minute.

[344] In a separate proceeding, we sought comment on whether we should adopt reporting requirements regarding aspects of spacecraft operations that may affect the ability of operators to complete appropriate satellite end-of-life procedures. *See In the Matter of Mitigation of Orbital Debris*, IB Docket No. 02-54, *Notice of Proposed Rule Making*, 17 FCC Rcd 5586 (2002). This issue will be addressed in that proceeding.

[345] "Mobile Satellite Service" is defined as a radio communication service between mobile earth stations and one or more space stations, between space stations used by this service, or between mobile earth stations by means of one or more space stations. Section 2.1(c) of the Commission's Rules, 47 C.F.R. § 2.1(c).

[346] *See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service,* CC Docket No. 92-76, *Report and Order*, 8 FCC Rcd 845 at ¶ 11 (1993) (Section 25.142(c) reporting requirements, including listing of non-scheduled space station outages lasting more than thirty minutes and their causes, provides information by which the Commission assesses the commercial and technical development of a satellite service, including its spectrum utilization); *accord Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to Mobile Satellite Service in the 1610-1626.5/248.5-2500 MHz Frequency Bands*, CC Docket No. 92-166, *Report and Order, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking,* 12 FCC Rcd 5754, 5799 at ¶ 10 (1997) (Section 25.144(c) with respect to DARS); CC Docket No. 92-297, *Third Report and Order*, 12 FCC Rcd 22310, 22335 at ¶ 62 (1997) (Section 25.145(g) with respect to the FSS in the 20/30 GHz bands); and *Amendment of Part 25 of the Commission's Rules and Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacing and To Revise Application Processing Procedures for Satellite Communication Services,* CC Docket No. 86-496, *Second Report and Order and Further Notice of Proposed Rulemaking,* 8 FCC Rcd 1316 at ¶¶ 21-23, (current Section 25.210(l) – then subsection (j) – with respect to the technical requirements for FSS space stations).

[347] *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, et al.*, IB Docket Nos. 01-185 and 02-364, *Report and Order and Notice of Proposed Rulemaking,* 18 FCC Rcd 11030 at ¶ 78 (2003).